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Traveling wave solutions describing the foam flow in porous media for low surfactant concentration

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We present a foam displacement model with a separate balance equation for the surfactant concentration in the aqueous phase. We consider the gas mobility that depends on the surfactant concentration and the dynamic behavior of foam as Newtonian. We study traveling wave solutions for the proposed model considering a high initial water saturation (drainage scenario) and varying the injected water saturation. The traveling wave solutions are studied using phase portrait analysis and validated with direct numerical simulations. For surfactant concentration at the injection and initial conditions above the Critical Micelle Concentration (CMC), we only found traveling wave solutions in the case when these concentrations are equal. For surfactant concentration at the injection and initial conditions below the CMC, we found traveling wave solutions whenever surfactant concentration at the injection is greater or equal to that at the initial condition.

Participation

In-Person

References

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